

FR FAST RECOVERY
SERIES™

M•1200/M•1400

FAST RECOVERY SERIES HIGH CURRENT POWER AMPLIFIERS



The world is full of amplifiers that do one thing – amplify audio signals. But at Mackie Designs, we've always put out the extra effort to provide more quality and more features than our competitors while maintaining a comparable (or lower) price.

The FR Series™ power amplifiers are designed to perform reliably under the most adverse conditions, and we've added a bundle of extra features, so you don't have to put out the extra bucks to buy a bunch of add-ons or plug-ins to make your sound system do what you want it to do.

Meticulous Detail

Perhaps the most important aspect of the FR Series amplifiers is the attention to detail in the design of the electronic architecture. We have incorporated a number of unique properties including Fast Recovery, sustained high-current output capability, high voltage and current slew rate, and defeat-able clipping eliminator, to ensure that the output of the amplifier is virtually distortion-free.

FEATURES

- Fast Recovery design for improved transient response and recovery from clipping
- Rack-mountable (2U) with rear support rails for extra support
- Separate left and right detented gain controls, calibrated in both dB and volts
- Balanced XLR and 1/4" TRS input jacks
- Balanced XLR thru jacks
- Heavy-duty binding post output jacks in parallel with:
 - M•1200 – 1/4" TS output jacks
 - M•1400 – Speakon® output jacks
- 6 LED metering including Signal Present and Overload
- Separate L/R Protect LEDs indicate the following protection conditions:
 - 1) Automatic turn-on delay to prevent potentially damaging thumps and pops from reaching your speakers
 - 2) Short-circuit protect with separate L/R indicating LEDs
 - 3) Thermal protect with combined Ch1 and 2 Cold and Hot indicating LEDs
- SCR Crowbar DC offset protect

MORE INFORMATION

**M•1200/M•1400
ARCHITECTS &
ENGINEERS
SPECIFICATIONS**

**"IN YOUR FACE"
SOUND REINFORCEMENT
& RECORDING BROCHURE**

- Low-cut filter with variable frequency control (Off – 170Hz)
- Subsonic stabilization eliminates ultra-low-frequency noise caused by microphone handling, stage rumble
- Constant directivity horn compensation with variable high-frequency boost control (2kHz to 6kHz)
- Amp Mode switch for Stereo, Mono, or Bridge modes
- Limiter to eliminate clipping in both channels
- Subwoofer mode switch with dual-frequency select (63Hz/125Hz)
- T-Design Constant Gradient Cooling Tunnel uses two short tunnels instead of one long tunnel for improved cooling efficiency and output device reliability
- Dual-speed cooling fan
- Toroidal transformer for reduced EMI emissions

MACKIE®



M•1200 M•1400

What is Fast Recovery?

Fast Recovery refers to the amplifier's ability to recover after being over-driven into clipping. Most amplifiers' output circuits tend to stay "latched" in the clipping mode, making their recovery time relatively slow, especially at high frequencies. Our FR Series amplifiers incorporate two unique circuit designs that completely eliminate the latching phenomena. The first is a Baker Clamp diode configuration, and the second is the use of two additional supplies that are at a higher voltage than the main supplies. Without getting too technical, the result is no latching and instant recovery from overdrive.

Durability. A word Mackie lives by.

Mackie mixers are well-known for their ability to withstand the abuses of the road. Most of Mackie Designs' employees have experience as musicians, roadies, or sound engineers in the real world of music entertainment and live sound reinforcement. We know what kind of

punishment sound equipment can be subjected to, and our engineers know how to design equipment that can take it.

Pro features even amateurs can understand.

Mackie's FR Series power amplifiers were designed with professionals – and amateurs – in mind. These amplifiers are great for live sound reinforcement applications as well as studio or broadcast control rooms. With the ability to deliver massive amounts of current instantly, the FR Series amplifiers can handle power-sucking subwoofers, yet remain discriminating and responsive when driving a bank of delicate tweeters.

Power Output.

The M•1200 is rated at 225 watts per channel into 8Ω, 400 watts per channel into 4Ω and 600 watts per channel into 2Ω. In bridge mode the M•1200 is rated at 800 watts into 8Ω and 1200 watts into 4Ω.

The M•1400 is rated at 250 watts per channel into 8Ω, 425 watts per channel into 4Ω and 630 watts per channel into 2Ω. In bridge mode the M•1400 is rated at 850 watts into 8Ω, and 1260 watts into 4Ω.

Sustained ultra-low impedance capability.

The FR Series power amplifiers are designed to drive low impedance loads effortlessly and reliably. Most power amplifiers have difficulty driving anything lower than 4 ohms, but the FR Series power amplifiers can easily drive 2 ohm loads all day long without breaking a sweat. This is a result of the careful and efficient design of the heatsink and cooling tunnels, which keep the output devices running as cool as possible, along with the virtual elimination of VI limiters, which can cause lesser amplifiers to distort or to shut down completely when driving low impedance loads.

Inputs, Input Level Controls and Metering.

The FR Series amplifiers are equipped with balanced, line-level input connectors for each channel in the form of XLR female jacks and 1/4" TRS phone jacks. In addition, XLR male jacks are provided as thru connections for daisy-chaining the input signal to multiple amplifiers. The XLR male thru jack is in parallel with the XLR female jack and the 1/4" TRS jack, and any one can be used as an input or thru connector.

Each channel has an independent gain control with 40 detents for accurately setting and matching the gain between channels. The gain controls are calibrated in dB (from off to 30) and in volts (with indications of 1V, 2V, and 3V).

Six discrete LEDs are used to indicate signal level for each channel, including a signal present LED, indicators at -20, -9, -6, and -3dB below full power, and an overload LED to indicate when the output has reached the clipping point.

Outputs.

The M•1200 and M•1400 differ in their output connector configurations. They both come with heavy-duty 5-way binding posts, which can accept standard double banana plugs, spade lugs, or bare wire (Export versions will not accept banana plugs due to European safety requirements). The M•1200 also has 1/4" TS phone jack outputs in parallel with the binding posts. The M•1400 comes with Neutrik brand Speakon® connectors in parallel with the binding posts.

Stereo, Mono and Bridge modes.

The amplifiers can be operated in one of three modes. In stereo mode, the amplifier operates with two inputs and two outputs. It accepts separate channel 1 and 2 input signals, and outputs separate channel 1 and 2 signals.

In mono mode, the ampli-

fier operates with one input and two identical outputs. It accepts an input signal through channel 1, and outputs the same signal at both channel 1 and 2 speaker outputs.

In bridge mode, the amplifier operates with one input and one output. It accepts an input signal through channel 1, and combines the power of both output sections into a single output, using the channel 1 positive and channel 2 positive speaker output terminals.

Clipping eliminator.

Mackie Designs power amplifiers use a method of protecting the amplifier and the speakers from clipping that doesn't affect the low impedance capability of the amplifier. A defeatable limiter employed that reduces the input signal when the output of the amplifier approaches the clipping point.

The moment the output level drops below clipping, the limiter turns off and is effectively "out-of-circuit,"

as well as all the other internal components, and finally out through the front. These designs are cheap to implement, but not very efficient.

Others use a cooling tunnel with the fan at one end. The problem with this design is that the heat from the first transistors warms the air so that by the time the air reaches the end of the tunnel it's too hot to provide sufficient cooling.

Our T-Design Constant Gradient Cooling Tunnel offers a much more efficient method of providing cool air to all the transistors without blowing contaminants all over its insides. A dual-speed fan is located in the center of the amplifier, directing air from the front of the

amplifier through a large intake manifold into the cooling tunnel. The cool air is evenly distributed

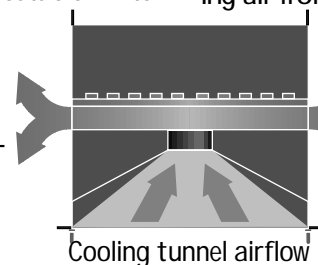
from the middle of the tunnel to each end, where the warm air then exits the amplifier on either side.



so it doesn't degrade the audio signal in any way.

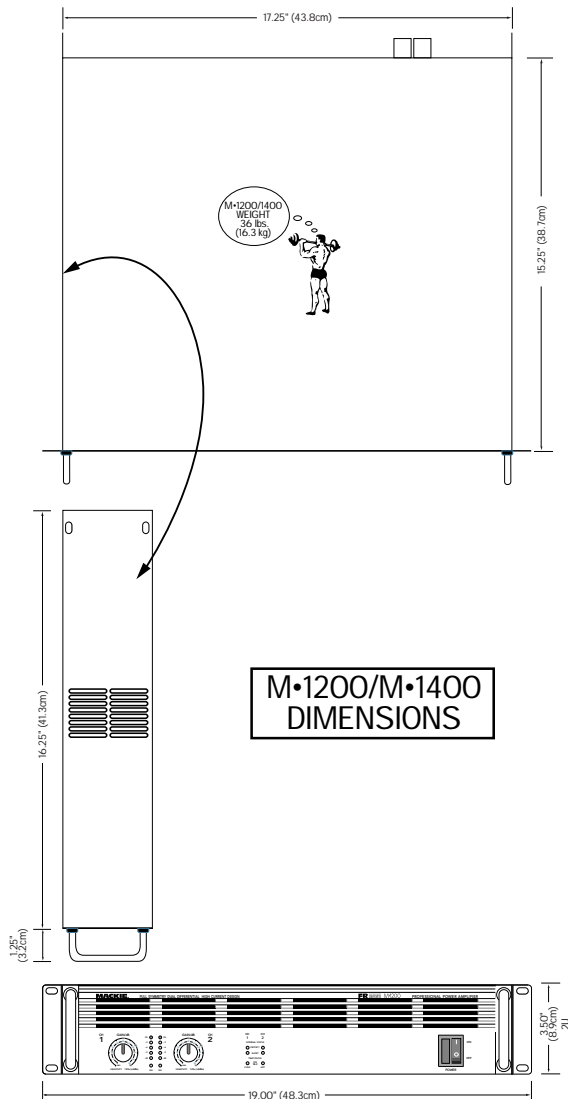
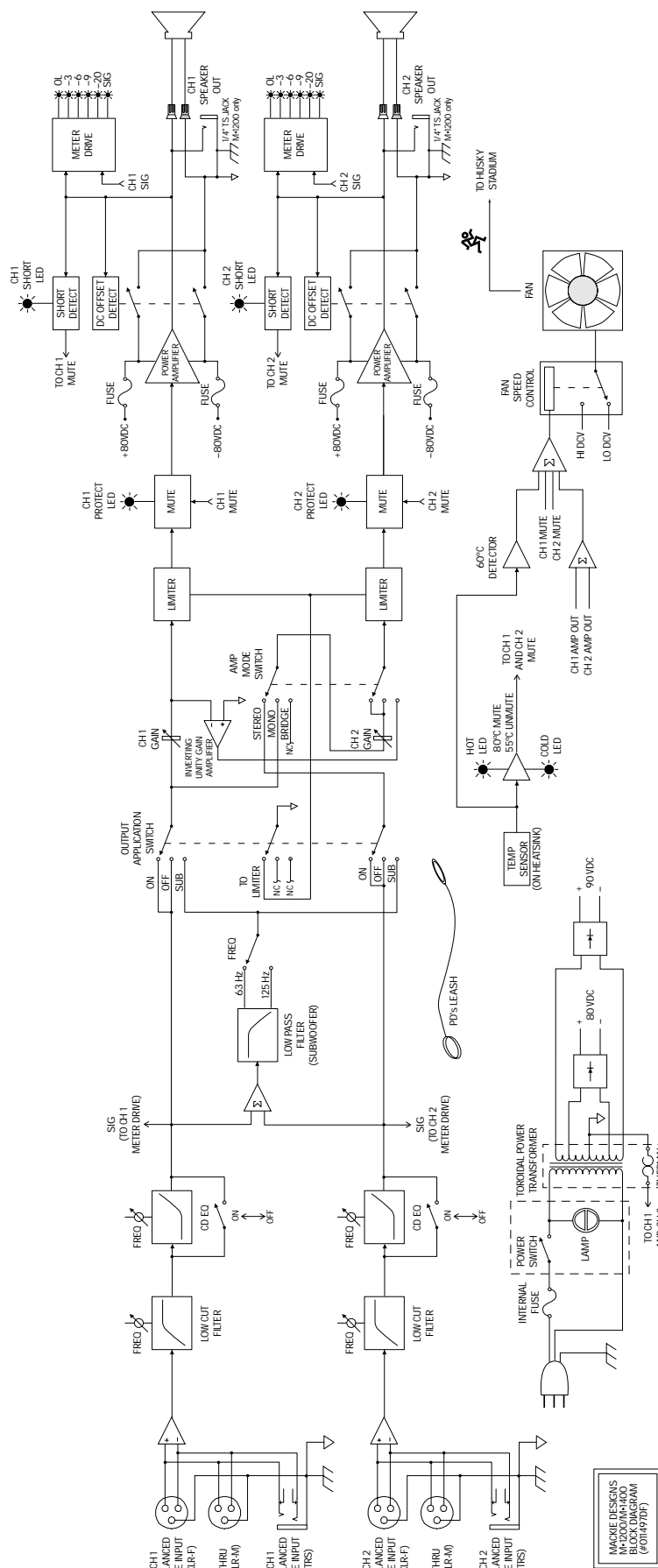
T-Design Constant Gradient Cooling Tunnel.

Most amplifiers have a fan in the back that blows air (along with dust and other contaminants) into the inside of the amplifier, across the heatsinks



M•1200/M•1400

Block Diagram



M•1200/M•1400
DIMENSIONS

Built-in subwoofer crossover.

The amplifier has a subwoofer mode that allows you to turn on the built-in subwoofer crossover. When activated, the signals appearing at the left and right inputs are summed, directed to a low-pass filter, and routed to both output stages. A switch selects the cutoff frequency of the filter at either 63Hz or 125Hz, and the amplifier can be set to either mono or bridge mode of operation.

Built-in constant directivity horn compensation.

When a compression driver is attached to a constant directivity (CD) horn, it requires a certain amount of high-





frequency boost to compensate for the natural roll-off inherent in all compression drivers. Some speaker manufacturers provide external processors with plug-in modules for each of the various combinations of horns and drivers (at an additional cost to you!) to compensate the CD horns.

Each channel of an FR Series power amplifier has its own built-in CD horn compensation circuit. All you need to do is set the variable-frequency horn EQ control on the amplifier to the manufacturer's recommended mass breakpoint frequency (the point where the frequency response begins to roll off). As an added feature, if you're not using CD horns, set the frequency control fully clockwise to the AIR setting to enjoy Mackie's exclusive AIR EQ, a gentle high-frequency boost that brightens and lightens the sound.

Low-cut filter.

Virtually all loudspeakers have a low-frequency cutoff point somewhere above 20Hz. Many low-frequency drivers have a -3dB point at 35Hz to 40Hz, while many stage monitor speakers cut off at about 100Hz; there's no sense in amplifying low-

frequency signals that the loudspeaker cannot reproduce.

Each channel of the FR Series amplifiers has a continuously variable low-cut filter. Simply dial in the frequency at which the loudspeakers drop off (anywhere from OFF to 170Hz), and reap the benefits of saving amplifier power with cleaner, tighter bass.

Built-in subsonic stabilizer.

Even with the low-cut filter set to the OFF position, each channel of the FR Series amplifiers has a built-in subsonic stabilizer (technically called infrasonic stabilizer). This dampens the very low frequencies, which can be caused by microphone handling or stage rumble. These frequencies are below the threshold of human hearing, and rob the amplifier of power and contribute to intermodulation distortion.

Protection circuits.

Both amplifiers are equipped with a number of unique and innovative protection circuits to ensure the safety of your speakers and the amplifiers.

Separate left and right Protect LEDs on the front panel indicate when a protection circuit has been activated. For example, when the amplifier is first turned on the outputs are muted for three seconds, during which time the Protect LEDs are lit. This allows time for all the equipment in the system to power up and stabilize, and prevents potentially damaging thumps or pops from propagating

to the speakers.

Separate left and right Short LEDs indicate if there is a short circuit at the speaker output terminals. This lets you know at a glance to check the speaker wiring for shorts (or recalculate the speaker load impedance) right from the get-go, so you don't waste precious time searching for the problem.

Combined left and right Cold and Hot LEDs indicate if the amplifier has overheated. Under normal operation, the Cold LED remains lit. If the Hot LED should light, the outputs become muted until the amplifier cools to a safe operating temperature, then normal operation ensues.

The FR Series: The most affordable, full-featured power amplifiers available.

As you can see, there is every reason the M•1200 and M•1400 are fast becoming the premier affordable choice for many sound reinforcement and recording applications. With their proven durability, professional features and specs, and certainly not least, low cost – the FR Series is destined to be a classic. There are no other power amplifiers in their class with all these features at such an affordable price.

And that's why people from all professions, with all kinds of different applications, prefer Mackie's FR Series. You'll like them because of their low price, easy-to-use features, and rugged construction. That's got to sound good. And, of course, Mackie does.

SPECIFICATIONS

Continuous Average Output Power, both channels driven:

M•1200

225 watts per channel into 8 ohms from 20Hz to 20kHz, with no more than 0.025% THD

400 watts per channel into 4 ohms from 20Hz to 20kHz, with no more than 0.050% THD

600 watts per channel into 2 ohms from 20Hz to 20kHz, with no more than 0.095% THD

Bridged mono operation:

800 watts into 8 ohms from 20Hz to 20kHz, with no more than 0.05% THD

1200 watts into 4 ohms from 20Hz to 20kHz, with no more than 0.095% THD

Maximum Power at 1% THD (per IHF-A-202):

250 watts per channel into 8Ω

425 watts per channel into 4Ω

640 watts per channel into 2Ω

850 watts into 8Ω bridged

1280 watts into 4Ω bridged

M•1400

250 watts per channel into 8 ohms from 20Hz to 20kHz, with no more than 0.012% THD

425 watts per channel into 4 ohms from 20Hz to 20kHz, with no more than 0.025% THD

630 watts per channel into 2 ohms from 20Hz to 20kHz, with no more than 0.050% THD

Bridged mono operation:

850 watts into 8 ohms from 20Hz to 20kHz, with no more than 0.025% THD

1260 watts into 4 ohms from 20Hz to 20kHz, with no more than 0.050% THD

Maximum Power at 1% THD (per IHF-A-202):

280 watts per channel into 8Ω

480 watts per channel into 4Ω

700 watts per channel into 2Ω

960 watts into 8Ω bridged

1400 watts into 4Ω bridged

Note: Power ratings are specified at 120VAC (U.S. and Canada) and 240VAC (Export) line voltages.

Power Bandwidth:

20Hz to 70kHz (+0, -3dB)

Frequency Response:

20Hz to 40kHz (+0, -1dB)

10Hz to 70kHz (+0, -3dB)

Distortion:

THD, SMPTE IMD, TIM

< 0.025% @ 8Ω

< 0.050% @ 4Ω

< 0.150% @ 2Ω

Signal to Noise Ratio:

> 107dB below rated power into 4 ohms

Channel Separation:

> 80dB @ 1kHz

Damping Factor:

> 350 from 0 to 400Hz

Input Impedance:

20kΩ balanced bridging

Input Sensitivity:

1.23 volts (+4dBu) for rated power into 4 ohms

Gain:

30.25dB (32.5V/V)

Maximum Input Level:

9.75 volts (+22dBu)

Rise Time: < 4.4μs

Slew Rate:

Voltage Slew Rate > 50V/μs
> 100V/μs bridged

Current Slew Rate > 32A/μs at 2Ω

CMRR: > 40dB, 20Hz to 20kHz

Transient Recovery:

< 1μs for 20dB overdrive @ 1kHz

High Frequency Overload and Latching:

No latch up at any frequency or level

Variable Low-Cut Filter:

10Hz (Off) to 170Hz,
2nd Order Bessel

Subwoofer Low-Pass Filter:

Switched: 63Hz/125Hz,
3rd Order Bessel

Constant Directivity High Frequency Boost:

2kHz to 6kHz (+3dB points)
6dB/octave high-frequency shelving filter, (shelving occurs at approximately 30kHz)

Turn On Delay:

3 seconds

Limiter Section:

Complementary Positive and Negative Peak Detecting

Indicators:

Six meter LEDs per channel

SIG (Signal Present),
-20, -9, -6, -3, OL (Overload)

CH 1 & 2

PROTECT LEDs

SHORT LEDs

TEMP STATUS

COLD, HOT LEDs

Power Consumption:

M•1200 **120V** **240V**

65 watts at idle 0.9A 0.5A

500 watts with musical program fully loaded 6.4A 3.2A
(4Ω per side, or 8Ω bridged)

850 watts with musical program fully loaded 10.0A 5.0A
(2Ω per side, or 4Ω bridged)

800 watts at full power into 8Ω (cont. sine wave) 9.3A 4.7A

1400 watts at full power into 4Ω (cont. sine wave) 15.0A 7.5A

2400 watts at full power into 2Ω (cont. sine wave) 24.3A 12.2A

M•1400 **120V** **240V**

65 watts at idle 0.9A 0.5A

550 watts with musical program fully loaded 6.7A 3.4A
(4Ω per side, or 8Ω bridged)

900 watts with musical program fully loaded 10.5A 5.3A
(2Ω per side, or 4Ω bridged)

850 watts at full power into 8Ω (cont. sine wave) 9.6A 4.8A

1500 watts at full power into 4Ω (cont. sine wave) 15.6A 7.8A

2500 watts at full power into 2Ω (cont. sine wave) 24.8A 12.4A

AC Line Power:

US 120VAC, 60Hz

Europe 240VAC, 50/60Hz

Japan 100VAC, 50/60Hz

Korea 220VAC, 60Hz

AC Drop-out Voltage:

At approximately 50% of rated line voltage

Physical:

Height: 2U = 3.5" (89mm)

Width: 19.0" (483mm)

Depth: 15.25" (387mm)

Handle Depth: 1.25" (32mm)

Overall Depth: 16.25" (413mm)

Weight: 36 lbs (16.3kg)



MACKIE®

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